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The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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GOVERNMENT INSPECTION OF COAL MINES.

THE INSPECTORS' REPORTS.

The reports of the several Inspectors for 1870, which have just been issued, are decidedly more favourable than those of the preceding year, for although the quantity of coal raised was 113,000,000 tons in 1870, against 108,000,000 tons in 1869, there were 24 fewer separate accidents, and 125 fewer deaths resulting from accidents. In the inspected ironstone mines the number of accidents had remained stationary. In referring to the statistics for 1869 we had occasion to remark that the accidents from falls of roof and coal continued excessively high, apparently owing chiefly to the carelessness of the men themselves, and it is gratifying to find that the present returns show a very satisfactory diminution; the separate accidents diminished from 451 to 402, and the deaths were only 411, against 466. As to the deaths from shaft accidents, the numbers are identical—129 in each year—and the deaths from miscellaneous accidents, underground and at surface, were 266 in 1870, against 264 in the preceding year, so that they may also be considered stationary, whilst the diminution from 257 to 185 in the number of deaths from explosions brings up the total improvement—that is, the diminution of casualties—to 12 per cent. In 1869 one life was sacrificed for each 99,777 tons of coal raised, whilst in 1870 for each life lost 113,900 tons were raised, showing that about 15 per cent. more coal was raised for each life lost. Again, there was in 1870 only one death for each 354 men employed, whilst in the preceding year there was one death to each 309 men employed. We subjoin our usual tabulated summary, which will permit of the several classes of accident being compared:—

COAL MINES—1869.

Names of districts.	Separate Accidents.					Deaths Resulting.				
	Explosions of Fire-damp.	Falls of Roof and Coal and Sides of Working.	In shafts.	Miscellaneous, underground and at surface.	Total.	Explosions of Fire-damp.	Falls of Roof and Coal and Sides of Working.	In shafts.	Miscellaneous, underground and at surface.	Total.
North Durham, Northumberland, Cumberland districts..	2	26	14	30	72	6	28	14	32	80
Southern division of Durham..	1	30	6	37	74	2	31	6	40	79
North and East Lancashire....	3	39	11	21	74	3	39	12	22	76
West Lancashire & North Wales	8	43	20	30	101	128	45	20	41	234
Yorkshire district	1	38	6	17	62	1	41	7	20	69
Derbyshire, Nottinghamshire, Leicestershire, and Warwickshire.....	5	31	11	23	70	6	31	12	29	78
North Staffordshire, Cheshire, and Shropshire	3	25	7	10	45	7	25	7	11	50
South Staffordshire & Worcester.	5	63	20	8	96	6	68	22	8	104
Sou.-West Div. (parts of Monmouth, Gloucester, Glamorgan, Brecon, and Devon....	6	37	—	8	51	23	37	—	8	68
South Wales district	9	62	14	30	115	70	63	15	12	181
Eastern district of Scotland....	1	29	8	17	55	1	30	8	9	58
Western district of Scotland ..	4	28	6	1	39	4	28	6	1	39
Total	48	451	123	232	854	257	466	129	264	1116

COAL MINES—1870.

North Durham, Northumberland, Cumberland district	3	36	7	38	84	5	36	7	39	87
Southern division of Durham ..	—	36	7	43	86	—	36	10	45	91
North and East Lancashire....	10	29	10	16	66	27	30	11	18	86
West Lancashire and Nth. Wales	6	47	20	14	104	25	50	20	35	130
Yorkshire district.....	9	43	13	18	83	11	46	14	19	90
Derbyshire, Nottinghamshire, Leicestershire, and Warwickshire	1	22	6	18	47	2	22	6	20	50
North Staffordshire, Cheshire, and Shropshire	6	28	12	14	60	33	28	12	14	87
South Staffordshire & Worcester	4	42	16	18	80	4	42	17	19	82
Sou.-West. Div. (parts of Monmouth, Glo'ster, Glamorgan, Brecon, and Devon)	3	27	3	18	51	3	27	3	18	51
South Wales district	7	51	12	32	102	61	53	17	32	163
Eastern district of Scotland....	5	28	5	7	45	12	28	5	7	52
Western district of Scotland ..	2	13	7	—	22	2	13	7	—	22
Total	56	402	118	254	830	185	411	129	266	991

IRONSTONE MINES—1869.

West Lancashire & North Wales	—	—	—	—	—	—	—	—	—	—
Yorkshire district.....	—	2	—	—	2	—	2	—	—	2
Derby., Notts., Leic., & Warwick	—	3	2	1	6	—	3	2	1	6
North Staff., Cheshire, & Shrop.	—	8	2	2	12	—	8	2	2	12
South Staffordshire & Worcester	—	6	3	5	14	—	6	3	5	14
South-Western Division.....	—	4	2	2	8	—	4	2	2	8
South Wales district	—	3	—	—	3	—	3	—	—	3
Eastern district of Scotland....	—	1	—	—	1	—	1	—	—	1
Western district of Scotland ..	—	2	3	3	8	—	2	3	3	8
Total	—	29	12	13	54	—	29	12	13	54

IRONSTONE MINES—1870.

South Durham	—	—	—	—	—	—	—	—	—	—
Yorkshire district.....	—	1	—	—	1	—	1	—	—	1
Derby., Notts., Leic., & Warwick	—	1	—	—	1	—	1	—	—	1
North Staff., Cheshire, & Shrop.	1	6	1	3	11	3	6	1	5	15
South Staffordshire & Worcester	3	5	1	2	11	3	5	1	2	11
South-Western Division.....	1	8	—	3	12	1	8	—	3	12
South Wales district	—	2	—	—	2	—	2	—	—	2
Eastern district of Scotland....	—	6	—	1	7	—	6	—	1	7
Western district of Scotland ..	—	2	3	1	6	—	2	3	1	6
Total	5	31	5	10	51	7	31	5	12	55

With regard to the number of male coal miners employed in and about the coal mines of Great Britain, the number of fatal accidents and lives lost in proportion to the quantity of coal raised, and the proportion of accidents and lives lost to the number of persons employed, all necessary information will be obtained from the subjoined table. The continued carelessness of workmen, especially in the use of powder, is mentioned in several reports, Mr. Brough recording several really instances of stupidity. In one instance an effort has been made on behalf of the superior officers of the mine to evade the responsibility, but it will no doubt ultimately be proved that the law, even as it at present stands, is strong enough to prevent this. The present system of inspection, as well as the number of Inspectors, appear to be ample to ensure all the safety which either the working colliers or the public can reasonably require; but certain improvements in detail seem necessary to ensure every officer of a colliery being made responsible for the safety of the lives under his care exactly in proportion to the amount of control with which he is entrusted. Every officer must be responsible for all officers whose appointment he can influence, and the owner must be responsible for his immediate deputy, even when that deputy is entrusted with full power. Extracts from the several reports are subjoined:—

1869.

Names of districts.	As computed by each Inspector for his own district.		Per separate fatal accident.	No. employed per life lost.	Tons of coal raised per separate fatal accident.	Tons of coal raised per life lost.	Number of collieries.
	Males employed.	Tons coal raised.					
Northumberland, Cumberland, & N. Durham	32,000	11,660,000	444	400	161,944	145,750	183
South Durham.....	37,800	15,636,000	511	478	211,297	197,924	163
North & East Lancashire	26,190	7,020,000	354	345	94,865	92,368	297
West Lancashire and North Wales.....	32,449	8,018,939	321	139	79,395	34,269	200
Yorkshire	36,000	10,893,500	581	522	175,702	157,877	413
Derby, Nottingham, Leicester, & Warwick	28,500	8,100,000	407	365	115,714	103,846	200
Nth. Stafford, Cheshire, and Shropshire.....	21,000	6,200,000	466	420	137,777	124,000	225
S. Stafford & Worcester..	28,500	10,408,000	296	274	108,416	100,076	550
Monmouth, Gloucester, Somerset, and Devon	26,000	6,250,000	509	382	122,549	91,912	210
South Wales	29,000	9,180,000	252	160	79,826	50,718	300
Totals—England & Wales	297,439	93,336,439					2741
East Scotland	28,000	8,500,000	509	483	154,545	146,552	270
West Scotland	20,007	6,137,043	513	513	157,360	157,360	195
Totals, Scotland	48,007	14,637,043					465
Totals & averages, England, Wales, Scotland	345,446	108,003,482	405	309	126,468	96,777	3206

1870.

Northumberland, Cumland, & Nth. Durham	34,000	12,500,000	405	*390	148,811	143,680	188
South Durham.....	41,100	16,800,000	478	452	195,349	184,615	162
North & East Lancashire	26,200	7,030,000	397	354	106,575	81,744	298
West Lancashire and North Wales.....	32,300	9,000,000	311	248	86,538	69,230	189
Yorkshire	36,500	11,545,400	440	406	139,101	128,282	417
Derby, Nottingham, Leicester, & Warwick.	28,810	8,366,000	613	576	178,000	167,320	197
Nth. Stafford, Cheshire, and Shropshire	21,000	6,500,000	350	241	108,333	74,713	225
S. Stafford & Worcester..	29,000	10,400,000	362	353	130,000	126,829	550
Monmouth, Gloucester, Somerset, & Devon..	26,000	6,500,000	509	509	127,451	127,451	195
South Wales	29,000	9,299,772	284	178	91,174	57,054	300
Totals—England & Wales	303,910	97,941,172					2721
East Scotland	27,330	8,595,238	607	525	191,005	165,293	220
West Scotland	19,654	6,339,315	893	893	288,150	218,150	201
Totals, Scotland	46,984	14,934,553					421
Totals & averages, England, Wales, Scotland	350,894	112,875,725	422	354	135,994	113,900	3142

The above tables really embrace all the general statistics contained in the reports, and a large amount of information as to the precise circumstances under which the several accidents happened is given in the reports for each district. As usual, the reports supply many valuable suggestions and observations of a practical character, those embodied in the subjoined extracts being among the number:—

Safety-Lamps *versus* Naked Lights.—In many mines, says Mr. Wardell, the safety-lamp is one of the last innovations the workmen like to see introduced. The chief objection is that the light given by it is so much inferior to that of a candle. But granted that the candle does yield a light superior to that given by many safety-lamps, is this circumstance or comparative safety the more important? He has been told over and over again by workmen bearing the reputation of being careful, steady, and intelligent that they would actually prefer running the risk of an explosion to working with safety-lamps. Amongst the arguments brought forward in support of the superiority of the candle over the lamp is one to the effect that all mines ought to be so sufficiently ventilated that no gas could exist in them, and, consequently, no danger arise from the use of naked lights. But this argument does not hold good in the case of mines (and there are too many of the kind in Yorkshire) where we know from practical experience sudden and enormous outbursts frequently occur, not always issuing from the seam in work, but sometimes proceeding from the floor beneath the seam, and where blowers are regularly given off. It is also contended that were lamps used instead of candles the diminution of light would occasion more accidents to happen from falls of coal and roof, but with careful attention to rules, and a strict examination of working places by deputies, as well as proper and regular use of props by the men, this would not be the case. He does not advocate the use of safety-lamps to the exclusion of other precautions, but in conjunction therewith. The strictest discipline, a rigorous and regular examination of all places, the use of timber, a stringent regard to the requirements of the first general rule as to an adequate amount of ventilation, and a due observance of all rules on the part of all concerned are, of course, essential to the safe working of all mines. A better proof of the utility of the safety-lamp cannot be given than a circumstance which occurred at Strafford Main, a large colliery in his district. An outburst of gas took place after the men had commenced their day's work. This outburst in a very few minutes spread over a large extent of the workings, extinguishing every lamp, and partially affecting the breathing of some of the workmen. The lamps used were Stephenson's. The colliery the moment before the outburst was well ventilated, and apparently in a perfectly safe condition, yet if there had been a single naked light in use the lives of the whole of the men in the mine at that time, upwards of 300, would, in all probability, have been sacrificed. Other cases of the same kind have come under his observation. No amount of ventilation in collieries where sudden irruptions take place can prevent them, and, therefore, the use of the safety-lamp is of paramount importance; but at all times, and whether a mine is worked with safety-lamps or candles, a thorough and efficient ventilation that sweeps clean every nook and corner, and is so divided as to take an ample supply of air into all working places, is absolutely necessary.

Responsibility for Colliery Management.—An instance of the difficulties with which the Inspectors have to contend in attempting to enforce the law against those who should certainly be held responsible for bad management of collieries is afforded in the report of Mr. Jos. Dickinson. On Nov. 30, at Leigh, the owners and principal agents of the Crumbouke, Atherton Collieries, were summoned for breaches of the first, second, and third general rules in connection with the explosion on Oct. 8. These cases were heard before Messrs. Oliver Burton, Jabez Johnson, J. T. Hayes, and Caleb Wright, four justices of the peace; and it was shown—1. That it was known by the underlooker, the fireman, and others that fire-damp, as previously described, was accumulated in the far end of one of the levels without air enough to expel it, and that when air might have been obtained the means were not applied, so that the fire-damp instead of being expelled became increased in volume until it filled the level as far back as 74 yards from the face, and that it there lighted at an allowed open light.—2. That instead of the fire-damp being fenced off to prevent access, as required, the signal for that purpose was so loosely set that it got knocked down, and was not seen by the persons for whom it was intended until the moment of the explosion, when they found it underneath a tub.—3. That the safety-lamps required to be used for trying the places were then, and day by day, issued and used unlocked instead of locked. The facts were not disputed, but it was contended to the effect that—1. That as adequate means were provided, and a supposed competent underlooker appointed, the owners and agent were not responsible for his neglect of the ventilation.—2. That the knocking down of the signal was an accident.—3. That the agent having ordered the lamps to be locked, he and the owners were not liable for what had occurred through the disobedience of the underlooker, the fireman, and the miners. The justices adopted the views set up on behalf of the owners and agent, and dismissed all the cases. These decisions, thus exonerating the only persons who can control the management and discipline, being contrary to what has hitherto been held, could not be left unchallenged. Mr. Dickinson's application, however, for a case to be stated for the opinion of a superior Court was refused, and he has been compelled to proceed through the tedious process of an application for a *mandamus*. This application having now been made, and the Attorney-General having, by virtue of his office, required a case to be stated, it is being prepared for the opinion of the Court of Common Pleas.

Education of Colliers' Children.—The Education Act of 1870 will, Mr. Wynne considers, go far to settle the vexed question of how the boys of miners shall be educated, as the grievance of having one law for the factory boy and another law for the pit boy will be remedied to a great extent, and will be obliterated if the School Boards in mining and factory districts adopt the compulsory clause of that Act. Whatever change may be made in the law with respect to boys between the age of 10 and 12 will not materially affect his district, but in Yorkshire and some other districts it will seriously affect them; and he still adheres to the opinion that it is better to work alternate days than to interfere with the working of a pit by any half-day system, and will be the means of employing more boys to be trained up as colliers, and so keep the rank full, instead of taking grown-up men into the pits, and thus increase the list of casualties.

Mechanical Ventilation.—The introduction into the Midland (Mr. Evans's) district of mechanical ventilation is of recent date. The initiative was taken, he believes, by the Staveley Coal and Iron Company, and the fan they chose was one by Mr. Guibal. They have since erected two others of the same kind, but of larger dimensions, one of them being over 40 ft. in diameter. The example of the Staveley Company was soon followed by Messrs. Oakes, of the Riddings, while fans, made by Mr. Waddle, were put up by Messrs. Barber, Walker, and Company (two Waddle fans), the Stanton Iron Company, and Lord Chesterfield. The Messrs. Wells, of Eckington Park, will shortly have one at work also. Mr. Mundy, of Shipley Colliery, and his advisers selected a fan on Mr. Rammell's principle. All these fans are giving complete satisfaction; the practical results being first rate. For all shafts of moderate depth, there can be no question but that mechanical ventilation is less costly, more effective, and therefore safer, than furnace ventilation; and so far as he is able to judge from examination and careful experiment, fans are preferable to other forms of ventilating machines, more especially as they are the least liable to derangement. He sees, from copies of experiments given to him by the viewers of the Staveley Company, and of Messrs. Barber and Walker, that the very high water gauge of 4½ inches has been obtained in both places. When we consider that the shafts in which these fans act are shallow, we can easily perceive that it would be impossible to obtain this result by furnace ventilation.

Education of Boys.—Judging from the experience of the working of the Act, Mr. Alexander feels quite satisfied that the half-time system is not applicable to mining; and it would be much better to fix a proper age at which boys might be allowed to work in mines, leaving the question of restriction thereafter wholly to the thoughtful consideration of parents or guardians. Every boy should have acquired an elementary education by the time he has reached 12 years. And if he has obtained a certificate of ability to read and write fluently, he should be allowed to labour without further limitation or restraint. In the case of a poor man, struggling with a large family, the earnings and assistance of a boy of 12 years of age is important, and indeed necessary. To place any other restriction appears quite uncalled for, and he is doubtful whether it would not be found more meddling, and difficult to enforce, than a thorough system of compulsory education. As to the advantage to be gained by the interference, he believes that the boy prohibited from working underground until he has reached the age of 12 years, and obtained an elementary education, has a better start in life in every way than the child allowed to work underground at 10 years of age, even though protected by law, which will be most difficult to enforce, from being employed more than half-time, till he has reached the age of 13.

Careless Use of Gunpowder.—In all his reports, and in all his underground remonstrances, Mr. Brough has pointed out how some mitigation of the evils resulting from the careless use of powder may be arrived at, mainly by the employment of experienced men in powder work, and then again that proper fuzes only be used, and that copper needles and prickers be provided; those made of steel should never be allowed to go down the pit. But for all the advice that can be given he is sorry to say that gunpowder calamities continue unremittingly throughout the kingdom. Five non fatal accidents have occurred in coal, as yet unattended with death, all by premature discharge of shot, and or the most part from want of dexterity; one of them clearly arose from ignorance. Unpractical persons, as already pointed out, should never be employed in blasting. Five workmen similarly suffered in ironstone mines, and the majority of these cases may be considered of a blamable kind. One of them is that of a miner who had loose powder in a paper, and either snuffed his candle into it, or the snuff drifted to the paper; he was smartly burned, and he certainly deserved it. But the two following events are almost incredible. Somebody left a bag containing about 8 lbs. of powder in a stall, and on the following morning it was put aside somewhere, in a recess or hole in the "gob." A day or two afterwards some miners found it, and knew very well what it was, and a boy (one of the party), with a candle in his hand, sat down right against it, and that candle ignited the contents of the bag, and they were all badly burnt. The wonder is that they were not all killed. They should have removed it to the surface, and reported the circumstance to the manager; but instead of that they sat down to have a talk, and let a thoughtless boy approach the powder, and fire it. The following fact is just as bad; he is inclined to regard it as still worse, though but one person suffered. A miner had charged a drill-hole with powder, to prepare it for blasting; but whilst taking it back to the place where it was usually kept, he actually carried the can of gunpowder and his naked light rattling against each other, and it is unnecessary to say that it exploded, and he was burnt. Mr. Brough admits that to withhold from our miners the advantage of the use of gunpowder in non-fiery collieries is of course out of the question; but he considers it is time that steps should be taken, and very rigid ones too, to regulate when, where, by whom, and under what conditions its enormously expansive force shall be availed of.

Specially Trained Colliery Managers.—In these days of keen competition, when progress and change are essential, the prosperity of a mining district must, Mr. Alexander considers, in a great measure be effected by the ready adaptation and further extension of well-contrived and safe-working economical arrangements. And unquestionably those who keep abreast of the times will be the most likely to attain the greatest amount of success in the end. Changed circumstances, involving more extended and intricate operations, particularly in the matter of underground haulage, demand the attention of persons of greater skill, and with more liberal and advanced views. And, notwithstanding the diversity of opinion as to the education or special training necessary for the managers of mines, it is a fact that the silent course of events is acting directly in that way; that is, greater inducements are now held out to persons of ability, and a better educated class of managers are gradually being promoted to situations of responsibility and trust. If immunity from accidents be regarded as a test of success, the year now ended has been one of the most successful ever experienced throughout the mines of the West of Scotland district.

Ventilation of Goaves.—Mr. Wardell considers that one of the most baneful methods of working, and one which is the cause of many explosions, is the bad ventilation of goaves. A danger incident to a goaf containing gas is that a sudden fall of roof may drive it out. In the greater number of cases, gas which proceeds from the goaf is not given off there. The largest discharge of gas generally comes from the seam in work, but where a goaf is imperfectly ventilated it lodges there and increases, until perhaps some sudden disturbance forces it out, and an explosion occurs at the first naked light it meets with. In goaves of large extent the only open parts are on their edges, the rest being all closed up tight. By leaving openings in the pack walls of the gates, which serve as air channels, the air travels as far back through the goaf as possible, and the open part is kept clear of gas. There is a plan in operation in some collieries which is much to be censured, the mixed use of safety-lamps and candles. A man, after his place has been inspected by the deputy, begins to work with a candle: should anything occur to render the safety-lamp desirable, he, at his own discretion, is to extinguish his candle, and work with a lamp, lamps and candles thus being indiscriminately used. He has found men

working with safety-lamps in a place where gas had been given off, while the men in the next bank, not many yards off, were using candles, although the air passed to them after having first been to the bank where safety-lamps were used. One essential point to be observed in order to diminish the dangers from explosion is the attention to the rule which enjoins that certain places are to be bratticed, or to have air-pipes or boxes within a certain distance of the face. Neglect of this rule causes a stagnation of air at the face, and, in consequence, should any gas be given off it is not diluted and rendered harmless.

SINKING PITS WITH ANIMAL POWER.—One of the deaths referred to by Mr. BROUGH is that of a boy 12 or 13 years of age, who was driving a gin horse at a sinking pit. He left its head for a moment, to have a look down the shaft, but he slipped and fell into it. It is a mercy that he was the only person that was killed, for a sinker was then descending, and he felt as it were the body of the poor boy rushing past, but fortunately it did not touch him. The sinking of winning pits with animal power instead of steam is an old-fashioned process, and it is not unreasonable to wish that it was an obsolete one; it is dangerous, and is the reverse of economy.

COMPETITION, STRIKES, AND WORKMEN'S WAGES.—Mr. MOORE reports that competition and the demands of workmen for higher wages and shorter hours of labour are having the usual effect of leading to the adoption of expedients for economising manual labour, and also for dispensing with horses, which are a source of great expense when the men work irregularly, and steam-engines for underground haulage are now more common. During 1870 the coal trade was better, and the prices obtained for coal were higher than the previous year. The colliers generally worked steadily, and had good wages. In some places, notably in Fife, the colliers' restricted their day's labour to eight hours, and in the Airdrie and Slammanan districts there was a strike for an advance of wages, which laster four or five weeks. This latter district employs about 2000 men, and raises 680,000 tons of coal annually. After much suffering the men yielded, and resumed work without getting any advance. Mr. Moore obtained from a coalmaster in the Airdrie district a note of the wages made by two of his colliers during the year 1870. The figures are taken from the pay-sheets, and are correct:—1. An ordinary collier, 54 years of age, mined and filled from a "room" 14 ft. wide in a seam 4 ft. high 791 tons of coal, for which he was paid 52*l.* 12s. 10d.; less deducted for sharpening tools, 8s.; ditto for medical attendance, 12s.; he worked during the year, 241 days; was idle, 47 days; was on strike, 24 days.—2. A first-rate workman at the same pit mined and filled 921 tons, for which he was paid 61*l.* 10s. 9d.; less deducted for sharpening tools, 8s.; ditto for surgeon, 12s.; he worked during the year, 254 days; was idle, 34 days; was on strike for higher wages, 24 days.

WORKMEN'S CARELESSNESS.—Mr. BROUGH gives an instance of extraordinary stupidity, or, rather, total disregard of the safety of a fellow-creature, although the wounded man is still alive; indeed, he may recover. He was a sinker in a pit commenced underground, a "staple," in fact, to prove some coal at considerable depth beneath the present working seams. The man, the delinquent, it may be said, who attended the sinkers on the top of the staple, received from the surface the bricks for the night shift, and actually stacked or piled them on the very edge of the trial pit, and in such a manner that a touch, or the concussion of the sound of a shot, would dislodge them, and, in fact, down they really fell, some of them, and struck one of the men who was working 44 fms. below, and the marvel is that he was not killed there and then. A more unpardonably careless act was never perpetrated. When he went down the main pit to examine into the matter he found plenty of space to pile the bricks at a safe distance from the "staple," had the man possessed the common sense to do so.

EMPLOYMENT OF FEMALES AND BOYS.—Mr. EVANS knows of no case in which females are employed in or about the collieries of this district. This is, no doubt, partly owing to the fact that they have no difficulty in finding far more suitable employment in the lace, cotton, and silk factories scattered over this portion of the Midland Counties. With regard to the employment of boys, they are not generally allowed to work underground in the thick mines until they have attained the age of 12 years, owing to the unwillingness of the managers to saddle themselves with the responsibility of seeing fulfilled the educational provisions of the Mines Inspection Act; in the thinner mines, however, it is often found necessary to submit to this, in order to keep up the requisite number of boys. No practical inconvenience is found to result from the exclusion of boys under 12 years of age from the thick mines, but he thinks that if the same system were applied to the thin mines it would be otherwise. The owners of most of the large collieries have erected schools for the use of their work-people. They are well conducted, and afford facilities for the education of children at a cheap rate.

HIDDEN FAULTS, AND TENDER STRATA.—Some of the accidents from falls of roof and coal are awfully sudden in their occurrence, and they have very often been described before. They are occasioned by concealed "backs," "slips," "bell moulds," "grimes," and "joints." If, in advancing our various workings, we were aware of their exact locality, we could, as Mr. BROUGH remarks, adopt remedial measures accordingly, and most assuredly would do so. But this geognostic structure is too often unseen, unknown, and unexpected; notice or indication of its presence is rarely given until the masses come down, and the mischief is accomplished in a moment, and too frequently with fatal consequences. Therefore, he is bound to repeat an opinion often expressed, both in the pit and in his annual reports, that the roof should be so timbered up as if these dangerous phenomena were actually present, though in truth that is by no means always the case. As a general observation, it would be preposterous to say that no possible process could be applied to support tender strata, or deal with ponderous overhanging matter; the wonderful performances of mining and civil engineers contradict any such supposition. The mode in which they have contrived to support enormous superincumbent weight all over and under the surface of Great Britain shows that skill and money can accomplish all things. But in coal mining commercial obstacles sometimes become a limit to expenditure. Severe competition occasionally places the coal trade in an abnormal position. British colliery owners distribute over the world the most useful of all mineral products, too often at but a very moderate rate per ton. It would afford to the managers a fairer opportunity for bettering the condition of their mines if the selling price were more remunerative. If combination and union always prevailed amongst our colliery proprietors, it is probable that home purchasers, and foreigners also, would willingly give the proper value of such unparalleled fossil fuel.

LONGWALL *versus* STOOP AND ROOM.—In former reports Mr. ALEXANDER has had occasion to remark that the mines conducted by the longwall system were more free from accidents than those worked upon the stoop and room method. The results of the past year confirm these observations, and he is inclined to think that future experience will tend to demonstrate the question more fully. It may be difficult to arrive at a correct mode of comparison, but probably the most satisfactory way would be to confine the enquiry to one district, where both systems are practised, in the same seams and under similar conditions.

ACCIDENTS AT MID-WORKINGS AND STACKING CLEEK COALS.—The arrangement to "cleek" coals in the open shaft at "mid-workings" is highly dangerous, and is a barbarous system. It is erroneous to suppose that these accidents always result from carelessness. An open shaft, near to which men require to work day after day, with an imperfect light, seems little short of a trap; and the best proof of the danger of such openings is the fact that "bottomers," placed purposely to look after the security of the workmen when near to the shaft, are the most frequent victims. The proposed Act of 1870 very wisely provided that "every working and pumping pit or shaft shall be properly fenced." Such a precaution, if required at the surface, must be doubly necessary for "mid-workings;" and in the event of any change being made in the statute relating to mines, he thinks the measure would be incomplete, unless it provided that such openings should also be securely fenced or guarded, and until such provision is introduced he does not anticipate further reductions under this head.

COAL RETURNS FROM COLLIERY OWNERS.—Although in this as in other years Mr. WARDELL has found no difficulty in obtaining from colliery-owners the necessary information for stating the aggregate production and proportion of life lost (except in the case of the same firm who invariably refuse it), he cannot help feeling it would be better either that the return should be made compulsory by Act of Parliament, or that no statistics as to quantities should be given by the Inspectors. The mere fact that the owner is asked confidentially by the Inspector for this return as a matter of courtesy places the latter, in his opinion, to a certain extent, under an obligation which is not at all desirable. At the same time he believes the statistics thus obtained form a most useful and valuable part of the annual reports.

HURRYING DOWN JENNY-GATES.—Mr. WARDELL remarks that hurriers frequently go before their tub, keeping it from coming too fast by pressing their back against it. In this way a sudden slip will do the mischief, the boy falls, and the tub runs over him. Hurriers ought always to *push* their tubs before them, or, if down an incline, to hold them back from behind, so as to prevent them attaining too great speed.

KEEPING BORE-HOLES IN ADVANCE.—It would be difficult, Mr. ALEXANDER considers, to estimate the amount of good, particularly in old mining districts, which has resulted from the observance of the 15th general rule. It provides that sufficient bore-holes shall be kept in advance, and, if necessary, on both sides, to prevent inundations, in every working approaching a place likely to contain a dangerous accumulation of water. It sometimes happens that the management, trusting to old plans, is deceived. In some cases it is questionable whether all the available information has been gathered; but, on the whole, it is encouraging to observe that in many instances where works are advancing in the neighbourhood of old and abandoned mines prudent precautions have been adopted long before the range of safety is passed.

EDUCATION OF COLLIERY MANAGERS.—In previous reports Mr. BROUGH has spoken of the views entertained by the late Mr. Nicholas Wood as to the education of viewers. He advocated a curriculum at the Durham or some other university; and Mr. Brough cannot free himself from the belief that such mode of study is, in some shape or other, a very great desideratum. It is difficult in grammar schools and private establishments to arrive at those grades of scientific knowledge which are so needful, and in after life so very valuable, to those who have to guide and direct operations underground. He does not for a moment propose to pass by practical experience, for without that great essential it is impossible properly to carry on mines at all, or manufactures, or, indeed, any other sort of technical occupation. But what he thinks might be brought about would be the blending of purely practical habits with a college career; of course, the latter of but moderate length of duration. Continental mining engineers, to a certain extent, possess the great advantage of this higher order of education, and the value of its adoption in this country would in all probability quickly manifest itself in the improved condition and comfort of our mines, and all other industries.

THE DOUBLE SHAFT SYSTEM RENDERED USELESS.—The mode of communication between two shafts is, as Mr. ALEXANDER remarks, more important than may at first sight appear. When the shafts are near to each other there will generally be no difficulty in reaching either, when required; but where they are hundreds of fathoms apart it will then depend upon the description of roadway, or opening forming the connection, whether a second means of outlet be at all times available. An opening through which a person may possibly drag himself with much toil and trouble is not a roadway. And he submits that it was never meant that such an outlet should be the means of egress for persons rushing from danger, in darkness and disorder, to a place of refuge or escape. In practice, however, he is afraid, unless something definite is insisted upon, that at works where the outlet pits are only visited occasionally, the communications leading to them will not always be available, at least under extraordinary circumstances, for the persons who work in them. The test is sure to come at some time or other; and it would be unfortunate in the case of a serious accident from explosion, inundation, or otherwise, if the opening professing to lead to the outlet shaft should be so small as to be utterly useless, or of such wretched construction that the wounded and suffering had to be abandoned, or could not by any possibility find a means of escape. To meet this want he would suggest that all openings made for the purpose of forming a communication between two shafts should be roomy and travellable, and never less than 4 feet wide, and 3½ feet or 4 feet high.

COLLIERS' DESIRE FOR KNOWLEDGE.—It is possible, Mr. BROUGH remarks, that he is not a clear observer, and is, therefore, unable to judge as correctly as others do; however that may be, it is not obvious to him that there exists any strong desire on the part of the mining classes to learn anything but the practice of their calling.

THE VENTILATION OF COAL MINES.

SIR,—The first element of safety in working coal mines and preventing accumulations of gas is a complete system of ventilation. To avoid these accumulations we require, in the first place, a sufficient motive-power to produce an adequate amount of ventilation in every place in the mine. Where doors are required they should be placed in pairs—one of wood, another of canvas—so that they both together could not be left open except through wilfulness. The use of a single door has given rise to many accidents, for a door is often so placed as to cut off the ventilation of a whole district if left open accidentally or otherwise. Again, we are liable to outbursts of gas in such quantity as to overpower the ventilation. Where a mine is subject to these accidents, we say that a furnace should not be used for ventilation—the motive-power should be a Guibal fan and a pair of engines, to ensure continuous ventilation.

The second element of safety consists in not using powder in mines where the means of lighting is with safety-lamps. We have frequently pointed out the necessity for the discontinuance of blasting, in order to the safe working of fiery mines; the practice is continued notwithstanding the severe warnings we have had of its danger, and the sad calamities it has given rise to. We would propose, then, as the best measures to attain security in coal mines, that the fan should be the ventilating agent, the system of ventilation being as perfect as possible as regards quantity of air, arrangement of doors, airways, &c.; and the discontinuance of the use of powder, in conjunction with safety-lamps.

It will be a matter of surprise to know that machine ventilation has not in a single instance, we believe, been adopted in the Lancashire collieries, though we know of no district to which that system is more applicable. A wretched adherence to the furnace system has caused many accidents in this as well as in other districts. We have great hope, however, that these lessons will not be lost upon us. The three principles we have named, if applied in the management of our collieries, will conduce very much to their safety, and to the well-being of all concerned in them. C. V.

Oct. 5.

EXPLOSIONS OF GAS IN COAL MINES.

SIR,—I have read with much interest the letters of "M. E.," from Newcastle, which have appeared in the last three numbers of the *Mining Journal*. They contain good practical advice, which, if carried out daily in fiery mines, would do much towards preventing explosions. I speak from many years' experience, being at one time officially connected with one of the most fiery mines in the British empire, and where most of the rules that "M. E." writes of were daily acted upon. In last week's Journal "M. E.," in alluding to bore-holes, says—"Your correspondent appears to have assumed that these holes, or small shafts, would become upcasts." "M. E." is labouring under a mistake. When I wrote about the bore-holes in 1867, just after the Oaks explosion, where several of my friends and acquaintances perished, I knew that most of them had lost their lives through suffocation, from not being able to get through the after-damp, it struck me very forcibly that if bore-holes of 2 ft. or 3 ft. diameter could be put down at certain extreme points of the workings the greatest number of those human beings in the pit at the time of any explosion might be saved, as not only would these bore-holes act as downcasts, but I stated that in cases of emergency both men and boys might be pulled out of them. I suggested at that time that the upcast shaft for working out a large area of coal should be 23 or 24 ft. diameter, as this would admit a number of these small shafts, all of them being downcasts, to send each of them their quantity of air into the large upcast. And I am more than ever convinced that these bore-holes, or small shafts, would not only be a great means of safety, but would, if well and wisely carried out by the colliery owners in each district, be an immense saving.

As coal is becoming every year deeper and deeper to work the sinking of new shafts becomes a very important and expensive affair. Now, if the various colliery owners in a large coal district could agree to employ regularly three or four men, with a small engine and the requisite boring machinery, to go from one part of the district to another, and put down one of these bore-holes, (say) at 1800 or 2000 yards from any shaft, these acting as downcasts, they might work out a very large area of coal at one set of shafts, and thereby save a large sum of money by not having to sink another set of shafts. I also stated in the article alluded to how one gigantic pumping or water shaft might, in many cases, answer for one district: with engine-power of from 2000 to 3000 horse, they might drain all the coal in the district, and lift a river at once; and, by letting the water run through two or three reserves, it might be made useful for a water works, and turned to a paying and profitable account, instead of, as it is now, each colliery owner sinking his own water or pumping shaft, and which never even returns him the interest of his money, but is a continual outgo as long as ever he keeps his pits working. But I do not know, Mr. Editor, that it is of much use anyone suggesting new ideas—as a nation we are very slow in adopting any new idea. GEORGE ADCROFT.

Bentinck-street, Ashton-under-Lyne.

EXPLOSIONS OF GAS IN COAL MINES

SIR,—Permit me to comply with the hope expressed by the Newcastle "M. E." correspondent at the end of Letter III. on Explosions of Gas in Coal Mines, in the Supplement to last week's Journal, as to the practicability of ventilating coal mines by bore-holes. At the novelty of the idea my wife laughed. She said "We must have one put down at the back-door, so that you can get to breakfast and dinner;" but when I told her that the mines most needing them might be some 300 to 600 yards deep, and that in the length there might be heaps of sand and seas of water that would wish to go down, she says—"It's no go; is it?" Well, I am sure that at such a place as Rhosddu Colliery, near Wrexham, they would be very glad if they could feel sure that the water would not get into the pit any more without bore-holes. At Pendleton Colliery, Manchester, they are casing a hole. I think it is 7 ft. 4 in. diameter, for 150 yards deep. I believe it is intended as a downcast for ventilation, as well as to raise coal. What area they will have for the purpose when the cage and tubs are going up and down I will say shortly, or if they adopt any other mode of ventilation, for I think it needful.

Bolton, Oct. 9. A MINER.

SAFETY FOR COAL MINERS.

SIR,—In referring to my former letter under this heading, in the Supplement to the Journal of Sept. 30, I beg to submit to practical men for their opinion if sufficient ventilation may be obtained in mines by boring the ventilators in pairs of 2 ft. diameter, placing a chimney over them, surmounted with an iron cowl (as now used in steamers, instead of the old wind-sail), and adding a vane by which the wind would turn one to face the wind for the downcast, and the other back to the wind for the upcast. I submit, also, if bore-holes of 2 ft. diameter may not be better than larger ones, both for economy and the allowing their being placed at less distances than if they were larger. These bored in advance of the workings for the escape of gas may later become ventilators. It appears though that I am not the first person who thought of boring ventilators, for I now find that in July, 1864, Mr. W. Mather read a paper describing Messrs. Mather's boring apparatus to the members of the South Wales Institute of Mechanical Engineers, and, in conclusion, said—"It has been suggested that a few holes of 3 ft. diameter, bored in places chosen with judgment, above extensive mines, would produce a ventilation incomparably better than the present system of two huge shafts to cause the draft." My ideas are as follows:—While boring for brine or salt abroad some years since we had a great escape of carburetted hydrogen gas (marsh gas), so that at night the wooden boring-tower would appear to be lighted up within. The gas would sometimes escape by a small window, 40 ft. in height, and play before it for an hour or more in so large a flame that the valley was lighted up for some distance around. Later when I tapped a brine-spring we had a considerable discharge of sulphuretted hydrogen gas. Not knowing the state of affairs until my return to England, I did not presume to offer an opinion on the subject, but now I consider it the duty of everyone to use his utmost endeavours to aid enquiry by stating any facts bearing on the subject. J. DEACON.

Kennington, Oct. 9.

ROCK-BORING BY MACHINERY.

SIR,—Capt. Wasley is as far wrong in his supposition of my character as he is in writing about the capabilities of the boring-machine when he knew he could not give any reliable opinion on it from the trial it had, or was likely to have for a considerable time to come. His not replying to my questions is a proof that he had not a sufficient knowledge of its capabilities to say anything whatever about it in the Journal which was likely to induce others to try it for the purpose of shaft-sinking, and, therefore, should have left it alone until he had something really good to write about. I never once hinted in my letter that the machine would not bore-holes, but rather that it would do so. I do not even now doubt the truth of Mr. Ball's statement that it did bore the number of holes he said, and in the time he stated; but he did not tell us how many of these holes have been blasted to no purpose, or how many of them are to be seen now in the shaft which will never be of any use for its effective sinking.

The great question is—Can holes be bored in a proper direction by the machine, as compared with manual labour, for the effectual sinking of the shaft? Perhaps Captain Wasley will answer this. I believe all will admit that for perpendicular boring the machine supersedes manual labour; but, unless it can be brought to work in a shaft in every slanting direction, and to start the holes in the sides and corners without men being first obliged to make a place for it, I believe manual labour will beat it.

The boring of a certain number of holes in a given time in a shaft is not what is required. What is required is to bore the holes in a proper direction, so that when they are bored they should accomplish the object for which they were designed; and if Mr. Ball can make his machine do this it will excel manual labour, and be a blessing to the country—but not else.

With regard to the unaccountable error I made as to the number of men employed, neither Capt. Wasley nor Mr. Ball's man can deny but there were worked in that shaft four shifts each day, and each contained five men, and if 59½ hours from Aug. 10 to Sept. 2 was all the time the machine was in operation it must have taken a considerable time to adjust it, or there certainly must have been a lack of energy somewhere.—*Oct.* 5. OBSERVER.

SWEETWATER MINES, WYOMING (U.S.)

SIR,—The unparalleled richness of the Sweetwater mines having attracted the attention of capitalists, both in the United States and Europe, it is possible that a brief sketch of the country would be acceptable, both to those who have already invested and those who contemplate doing so.

These mines are situated in Sweetwater County, Wyoming Territory, in about latitude 42½° north and longitude 109° west of Greenwich, some 60 miles in a direct line north of the Union Pacific Railroad, and about 12 miles north of the Pacific Springs, in the South Pass, on the old overland California route. The best way of reaching these mines is to leave the Pacific Railway at Bryan, from which point a line of coaches run directly to the mines. The distance by this route is 95 miles, and is travelled in 14 hours. The fare by coach is $15, or about 3*l.* sterling. The distance from Sacramento, California, to these mines is about 1000 miles, and from Chicago about 1200 miles. Freight is carried from Bryan to South Pass City at from 1½ to 2 cents per pound, and from Chicago at 4½ to 6 cents.

The early history of these mines is comparatively unknown. It is known, however, that gold was discovered here as early as 1842, but no real work in prospecting and developing quartz lodes was done until the fall of 1866, when a party of 50 men came and wintered on the Sweetwater river, 8 miles from South Pass city. On June 8, 1867, the now celebrated Cariso lode was discovered, and a mining district organised. The discoverers of the Cariso lode immediately commenced work, when the Indians made an attack upon them, and drove the entire party from the country. They, with others, returned, and recommenced work on the Cariso, on July 28. $1600 was realised by crushing the outcropings of the lode in a hand mortar, and $7000 from sluicing the wash from the ledge in the gulch below the vein. This ledge is now in full operation, with hoisting works and stamp mill. The next ledge discovered was the Miners' Delight. This has proved the richest ledge of any yet discovered, having survived under the most reckless management that it is possible to imagine. This mine has also hoisting works and stamp mill, and is now in full operation. At the present time nearly 2000 lodes have been discovered. These lodes almost universally run in a north-east and south-west direction, and have an incline from 45° to 90°. The average incline, however, is 75°.

The three principal towns are South Pass, Atlantic, and Hamilton cities. The two latter are situated respectively 4 and 8 miles north-east from the former, and are all in direct communication by coach and telegraph with the main lines of the Union Pacific Railway. Both Atlantic and South Pass cities are traversed by creeks, or gulches, which furnish water sufficient for any number of mills. Hamilton has a number of living springs, each of which furnishes sufficient water for 20 stamps. There are now already erected, and nearly all in full operation, 11 stamp mills, containing in all 136 stamps: these stamps will reduce 1½ ton each per day of 24 hours. The ore of this district is mainly quartz, with a slight proportion of oxide of iron. It closely resembles the quartz of California, and shows in many instances specks and threads of free gold. The gold is extracted by the ordinary mill process, which is the cheapest and simplest method of reduction. No base metals have as yet been discovered, and the careful millman has never failed to save 95 per cent. of all the gold contained in the ore.

The Hermit Mill, from July to November, 1868, with six stamps, crushed 1040 tons of ore, which averaged $36 per ton; and from April 20 to July 1, 1869, reduced 480 tons of ore, averaging $47 per ton. This ore was all taken from the surface of different ledges, and was reduced merely to prospect the different lodes. The gold contained in the ore is not very fine, flour gold being rarely met with. It is of good quality, being from ·850 to ·925 fine. Timber is very plentiful in the immediate vicinity of the mines. Mining timbers, squaring 8 inches, 20 feet long, are worth $1 each, delivered at the mine. Fuel is worth from $2½ to $3 per cord, delivered. Miners' wages are $4 currency per day, surface men from $3 to $3½ per day. Lumber is worth $30 per 1000 ft., delivered; powder, $8 per keg of 25 lbs.; quicksilver $1 per lb. Stamp mills, with necessary buildings and attachments, can be erected for $1000 per stamp; average cost of mining and raising ore to the surface, $5 per ton; cost of reduction, $3 per ton.

It is almost impossible to arrive at anything like a correct estimate of the amount of bullion extracted since 1868, as but a small proportion passed through the express office. Miners were paid in gold, they paid their bills in gold, the merchants paid for their goods in gold, carrying it with them to Chicago and other eastern cities, and every miner leaving the camp was accompanied by a companion in the shape of a well filled bag of dust. It is, however, safe to say that to July 1, 1869, $300,000 worth was extracted. To July, 1870, this amount was equalled, and since that time has very largely increased. The sum total is certainly small compared to the amounts of bullion produced by the neighbouring territories, but it is large when we consider that four years ago the country was an unexplored desert, and practically inaccessible. The fact that a few poor miners, unaided by capital, have succeeded in developing a country, and extracting this amount of gold, facing for the first

two years the most dreadful Indian atrocities, speaks well for the value of the mineral resources of the country.

The Government in 1870 established two large forts in the vicinity of the mines for the protection of the miners. These forts are defended by artillery, and have two companies each of cavalry and infantry. Since the construction of these forts no hostile Indians have been seen in the country.

In conclusion, I must say that I shall be pleased to furnish a description of some of the mines, giving the statistics of amounts of expenditure and gross results from the location of the properties to the present time. M.

Wyoming Territory, U.S., South Pass City, Sept. 1.

ROUTES TO THE MINING TERRITORIES OF THE UNITED STATES.

Sir,—Of the several lines of travel from New York to Chicago, the Pennsylvania Central and Fort Wayne road, which takes the traveller through the Alleghany Mountains, excels the other routes in grand and beautiful scenery. The palace cars on the route afford every comfort, and the excellent management of the road impresses the traveller with a full sense of safety. I have been over this route at least 20 times, and have never yet been detained, or been off of time, which is saying a great deal for an American road. From Chicago the direct route is *via* the Chicago, Burlington and Quincy, Hannibal and St. Joseph, and Kansas Pacific Railway, to Denver. Should the traveller have time to visit the city of St. Louis, let him take the Chicago and Alton Railway, which is provided with both palace and dining cars. Tourists and travellers visiting the mining districts of the West will find this route the best, as by taking it they can see the mines of Colorado without going out of their way, for on leaving Denver they intersect the Union Pacific Railway at Cheyenne. The Kansas Pacific route is unrivalled for beauty and variety of scenery. The magnificent valley of the Kansas stretches west towards the Rocky Mountains for 200 miles from the Missouri river; and a little further west immense herds of buffalo roam over the broad prairies, affording a sight not to be witnessed on any other railway in the world. Small herds occasionally race with the locomotive, and it is to be regretted that the railway officials permit parties to open a murderous fire on them from the platforms of the cars. W. J. R.

THE MANAGEMENT OF MINES.

Sir,—I am glad to see a correspondent touch upon an important consideration in mining, viz.—the "management." I could point out a large number of mines capable of making a handsome return upon the working capital if they were only managed and worked in a proper manner, and yet many of them have been abandoned as worthless, and others hardly paying expenses; while others, again, are nothing but expense. The consequence is, that mining has become a word of terror to those who are and have been the victims of bad management—in other words, a want of economy and skilful operation in the development of the mineral property. In one mine that I inspected and surveyed I found that more than 1000*l.* could have been saved in the driving of an adit level alone, and 500*l.* in making a simple cross-cut to the same lode, and this, too, from no other cause than a want of a proper working plan; and yet this 1500*l.* is only an item of the unnecessary expense incurred at the same time from a want of proper management. They are blundering and wasting their money day after day, and will never have a good mine till they abandon their present mode of working, and adopt a better, and then they will undoubtedly have a splendid mine. I know of another large mine that is now abandoned, yielding on an average 150 tons of ore per month, and the cost of raising and dressing did not exceed 50s. per ton, still would not pay. At the same time, the master lode is untouched. I could multiply examples to a large number to prove that, as a rule, where mines do not pay it is more from a want of skilful management and economy than from the unpayable condition of the mine itself. In this respect the mines of Great Britain and Ireland need our best attention, and all who are interested in mining should spare no effort to effect a proper system of management, and then we shall see mining become one of the most remunerative branches of industry, as well as a tangible security for the capitalist. M. Heslop, M.A.I.

Doncaster, Oct. 9.

"SCIENCE OF INVESTMENTS."

Sir,—When limited liability was first suggested, and subsequently adopted by the Legislature, it was never contemplated that the shareholders' risks should become practically unlimited, as was proved thereafter in the Overand and Gurney's, Barnard's Bank, and many other mercantile and finance companies in the year 1866. Creditors were supposed by the public to be satisfied up to that crisis with the assets represented to have been received, and not to rest their claims on the power of the directors, or the winding-up courts, to enforce the payment of the uncalled capital on certain sections of the proprietors when many of their co-partners failed to respond to their proportion. The law does not yet fulfil the intention at first propounded in Parliament, yet the reduction of uncalled capital by many long-existing companies wherein the grievance was felt added to the now generally adopted custom of having every farthing of the capital paid up at starting, when further liability ceases, indicate already what is needed, and thus practically limited liability is secured. Investment is by no means a difficult thing to those possessed of accumulated wealth. The hoards of the rich heiress, or the millionaire widow, the hereditary acres of the mighty peer of long and honourable ancestry, or the gains of the fortunate soldier, lawyer, or merchant, can be used profitably and invested safely, if the possessor be well guided, or even moderately well informed; but there yet remains to be considered that vast congregation of smaller investors who win their way to moderate competence—in other words, who earn with patient care, contrivance and self-denial something beyond the mere cost of their subsistence. The man who counts carefully every halfpenny earned on a pound of sugar, or every farthing on half a pound of candles, has, perhaps, at the end of the year just that surplus gain which to him is equal in importance to the gathered rent-roll of the favourite of fortune, at whose area gate, in luxurious Belgravia, or imposing Kensington, he humbly waits cap in hand soliciting orders from over-fed cooks or powdered servants in attendance on the great.

The true investor, if he would win must graduate as a student of his science; he must call forth painstaking labour to his aid, or he will probably lose his money. He should not be a jobber upon the surface-current of a market, nor should he be the haphazard gambler, but on the contrary he should select securities and mediums for the employment of his capital wherein the risks are minimum stability fully established, and the prospective at the maximum standard. If he be from inclination, circumstances, or natural qualifications unable or unwilling to act entirely on his own judgment, then he should consult practical authorities and act under their direction, not seeking their advice and then acting on the suggestion of friends or other interested parties in direct opposition to the counsel he receives from those who are paid and both able and willing to guide him right. The investor and market jobber are, or ought to be, two distinct types of individuals.

There are risks associated with banks, insurance companies, and railways, and there are also risks with mining; but, with the exercise of ordinary precautions, such as are observed by men of business in their daily pursuits, there is no greater hazard in British mining than in any other description of our home enterprises. Wherein in banking, shipping, insurance, or building can experience point to such prizes as the Dolcoath, Van, Minera, Botallack, Levant, Devon Great Consols, Great Laxey, Carn Brea, Tincroft, Cook's Kitchen, Great Vor, East Pool, Lisburne, Cwmystwith, and others too numerous to mention, and now prominently upon the *tapis*? It is true such sparkling gems fascinate more than they deter, and, from the active progress in mining affairs and pursuits now apparent throughout the country, there cannot be a question raised and established but that the public are satisfied with the gains they derive from *bona fide* and legitimate mining. It is well known by practical authorities that there are as good fish in the sea as ever were caught, and that there are as many future prizes in mining as have already been discovered; hence there is every promise of several sound progressive, though at present non-dividend, undertakings soon becoming public favourites and recognised successes. It is from this description of property that the investor acquires his largest gains, as risks are all but surmounted, prices of shares often ruling low and unduly depressed, whilst development during a few months will assuredly send them, like meteors in the sky, through the ranks of society to illuminate the value and worth of this most important branch of our home industry.

Experience is required in the selection of properties, whether mines, foreign bonds, home industries, and mercantile associations, such as railways, banks, insurance, telegraphs, and even asphalte companies. Therefore, those who intend to embark should pay the fee required for a practical selection of securities open for profitable employment of capital, whilst many who have already become enlisted in companies the merits of which are unknown to them, would do well to obtain an opinion before they get "too deep in the mire."

To become a successful investor one must possess knowledge, judgment, nerve, and money. Knowledge is the product of study; judgment is a natural gift, assisted by knowledge, and, indeed, impossible without study; nerve is also a natural gift, but that, too, may be cultivated by the abnegation of excess, and by moderation in all our indulgencies. The possession of money may be accidental, or it may have been earned by the proprietor; still, taken in the long run, money belongs to the man who has the power and the will to grasp and retain it. Recently we have seen, from many and signal examples, that vast wealth, handed down from generation to generation, cannot always be held by the hereditary possessors of the hour; while, on the contrary, we can point to thousands of cases in which the poor man has risen by thought, care, and economy to great wealth; and associated with the mining interests of Great Britain are more striking instances to be found of "individual merit and self-effort" being rewarded than are allied with any other branch of native labour—*i. e.*, there is no scope to the perseverance and self-sustaining energy of the hard-working miner; whilst, from the constant discovery of deposit after deposit of the hidden wealth existing throughout our several acknowledged mineral districts, there is no fear entertained of even an approaching sign of incipient exhaustion to our vast resources.

R. Tredinnick,
Consulting and Mining Engineer.

3, *Crown-court, Threadneedle-street, London, Oct.* 12.

WITH WHAT ARE THE STRATA ABOUT PRODUCTIVE COPPER LODES MINERALISED?

Sir,—Permit me to make a few remarks on the subject of Mr. R. Williams's letter, which appeared in the Supplement to last week's Journal, headed as above. Certainly the subject is of great interest, not only to the scientific miner and the capitalist, but also to scientific men generally, for each and all are anxious to know the cause of mineralisation, whether in a lode of copper, or lead, or iron, or anything else; but the manner in which Mr. Williams treats the subject does not appear to me to be any less vague than that of the mining reports to which he refers in his letter, for he never once tells us with what anything (except copper ore) is mineralised, although he distinctly implies that the constitution of the lode is derived from the strata by which it is bounded. Now, if this were the case, it would be impossible to find in a lode any element not found in the strata in which it existed, yet in point of fact lodes or veins, as a rule, are entirely different in their chemical elements and constitution to that of the strata by which they are bounded; and were this not the case we might as well (according to Mr. Williams) work the strata for copper as the lode, because, as he asserts, the lode derives its constitution from that of the strata. If a lode or deposits of ore—copper, lead, iron, or anything else—depended upon the strata in which they are formed I would simply ask—Why is it that each is so very different both in their elements and chemical constitution? And, in order to get a definite answer, I would ask Mr. Williams to give us an instance of some strata in which a copper lode exists, and of the chemical elements of both the lode and the strata? Also, in reference to the decay of minerals, I should like to know how it is that arsenic is a sign of the decay of copper, when its does *not* enter into its composition? In conclusion, I hope the time is not far distant when mining will be more scientifically performed than it would at present appear to be, and when all captains and managers will be favoured with a scientific training. Then we shall be free from the blundering guess-work which impedes the progress of British mining at the present day. Mining Engineer.

THE NEW BLENCOWE TIN MINING COMPANY.

Sir,—Being largely interested in Cornish mining adventures, I read with much pleasure the letter of your well-informed correspondent, Mr. R. Symons, in the Supplement to the Journal of Sept. 16, respecting the undeveloped mining districts of Cornwall. I reside nearly 500 miles from this town, and so long a journey is sufficient proof, I think, of the interest I take in the mining operations of this county. My chief object in travelling so far was not only to study the geological formation of this wonderful locality, but to be present at the first trial of a large new engine, which has just been completed, with the object of pumping out the water from the once well-known old working of the Wheal Blencowe tin sett. This mine is situated about two miles north-east of the village of Grampound, and is in the very centre of a magnificent stratification of already discovered tin lodes. A small private company of North Country gentlemen having been formed to work this mine, every exertion has been made to commence operations forthwith, and it had been arranged that the directors and their friends should meet together on Monday last to witness the starting of their new pumping-engine, the largest of the kind in this neighbourhood. Unfortunately, the weather was most unpropitious for the occasion; but, notwithstanding this, a select party gathered together at the mine, where Capt. John Edwards (under whose able superintendence the engine and engine-house have been erected) received them, and explained the intended operations. All being quite prepared, the amiable and accomplished wife of the managing director, the only lady brave enough to encounter the waring elements, then, amidst the cheers of all present, stepped upon the raised dais, and, by the direction and assistance of Capt. Edwards, gracefully opened the steam-valve of the engine, when the huge, but beautiful, machine commenced its giant's work with a smoothiness and regularity that astonished and pleased everyone. After watching its ponderous, noiseless motion for awhile, and seeing the vast volumes of water brought up at each stroke to the mouth of the shaft, the whole party adjourned to the comfortable offices of the resident agent close by, where they partook of a substantial luncheon, succeeded by speeches and good wishes for the future prosperity and success of the Wheal Blencowe tin sett.

The mineral richness of this district, to all appearance concentrated at Blencowe, is really surprising, and with the energy, economy, and discernment that has hitherto been shown, both by the directors of this new company and their clever agents, there can be no donbt that the mine will prove ere long a most profitable and lasting undertaking for all concerned. The greatest praise is due to Capt. Edwards for the energy with which the work has been pushed on, and his very great experience both in the old and abandoned workings of this mine, and in mining matters generally, renders his services as captain to the new Blencowe Tin Mining Company most valuable. Another large and powerful engine, with several heads of stamps, will shortly be erected for crushing the tin ore, and I firmly believe that the yet undeveloped resources of this district will at no distant date agreeably astonish all those who are now interested in proving it, and have invested their capital with that object.

Royal Hotel, Bodmin, Sept. 28. An Adventurer.

NEW ZEALAND QUARTZ CRUSHING AND GOLD MINING COMPANY (LIMITED).

Sir,—I am happy to say that this poor company is at length emerging from the many troubles into which it was plunged at its birth, and which more than once have threatened to swamp it. Thanks to the energy, intelligent management, and faithfulness of Capt. James Thomas (now the company's manager and sole agent in New Zealand), "the works" have been brought into a most efficient state, and confidence is fully established in the economic and trustworthy character of the manipulation to which the ores are subjected. The Government tramway from the quartz ranges to the mill is finished and in operation, conveying ore direct into the battery sheds for crushing, and thus avoiding all loading, unloading, and handling. The company will soon have 16 more stamps erected, bringing up the batteries to 32 heads, which Captain Thomas thinks will reduce 70 tons of ore daily, whilst the Government tramway can supply a far larger quantity. With this amount of "custom" work alone the mill can earn a good and certain dividend on the capital of the company, but when this is supplemented by the additional profits derived from crushing quartz on shares, purchasing and re-working tailings, and also from mining and reducing our own quartz, I think that the dividends of the company will be very large indeed. Entertaining the strongest conviction upon this point, I earnestly advise those who hold shares in the company not to sell them on any account, but to retain them, and reap the profits that are now certain to be realised. Those who sell will surely regret it very speedily. A Shareholder.

London, Oct. 11.

EBERHARDT AND AURORA MINING COMPANY.

Sir,—As an outside observer, removed from the misguiding influence of silly but designing rumours, it has been, and still is, a matter altogether incomprehensible to me that really *bona fide* shareholders should allow themselves to be toyed with as if without any steadfastness of purpose, or utterly unable to form an opinion for themselves as to the inherent merits of the enterprise in which hitherto they have had reason to place such unbounded confidence. The enormous depreciation in the value of the shares—not much less than 100 per cent.—cannot possibly be the unaided result of the admittedly incomplete letter of Mr. Philipotts, which (judging by its incompleteness) was never intended by Mr. Philipotts to be his report upon the producing capabilities of the several mines, nor to show the other valuable sources of revenue possessed by the company. It is clear that the market operation known, I believe, by the expressive, though somewhat inelegant, term of "banging," has been set to work, and certainly the workers would seem to have been signally successful in positively frightening some weak-minded shareholders out of their holding, which, of course, is just the very thing played for by the ursinical players.

Let us just for one moment admit that everything put forward by these uniform depreciators—persistent "bears"—to be entirely true, even then, as was shown by "A Shareholder," writing in last week's Journal, the net return cannot under any circumstances, however adverse, be less than 20 or 30 per cent. per annum upon the capital of the company—that is, allowing nothing whatever for any result from either of the mines, as there are perpetually independent sources of revenue to be derived from leasing the water-power and utilising the stamping-power. But who has told us (save the "bears") that this unsatisfactory change has taken place at our respective mines, which, be it remembered, during July and August—since which no advices as to results have been received—realised a profit something approaching 30,000*l.*? Mr. Phillpotts has not; nor has he in any way indicated that any change, except for the better, has taken place, for he distinctly states that "it will be satisfactory to the board to know that the mines—the life-blood of their undertaking—are in so excellent a condition, both for present and future work."

What though the International Mill, "the finest in the world," capable of reducing from 80 to 100 tons of ore daily, may cost us 65,000*l.* or 70,000*l.* instead of 50,000*l.*—what though the wire tramway may cost us 25,000*l.* instead of 10,000*l.*—what though the invaluable water-course may cost us 4000*l.* instead of 3000*l.*, making a total excess of expenditure really on capital account of (say) 30,000*l.*—what though it should eventually transpire, which it may, and no doubt will, that the amount of capital at the command of our board is unequal to meet this additional outlay, surely this is an insufficient reason for an aggregate decline in the value of our shares of between 400,000*l.* and 500,000*l.* Why, the two months' profits of July and Aug. are alone sufficient to meet the surcharge upon capital!

The coolheaded un-ecstatic shareholder must have calculated that the current rate of profit is 180,000*l.* per annum, equal to a dividend of 8*l.* per share per annum; and as to the bugbear about the mines declining in value, those unacquainted with such matters should know that the richest mine ever discovered continually varies in value—that it is, indeed, the leading, and (to a miner) the desirable characteristic of our most productive mines. And why, let me ask, should the three mines of this company prove an isolated instance to the contrary? Ores found in this formation, and especially chlorides, are, perhaps, even more variable than others, but this is more than counterbalanced by their great richness and comparatively inexpensive cost of reduction. The would-be *quidnuncs* told us not long since that the Ward Beecher was a very rich mine, both Eberhardt and Aurora were irretrievably poor. But what do we find? Why, in following one of the "strings" or "squeezes" of the vein that which is known as a "chamber" was opened upon—that is, the "squeeze" bellied out, so to speak, and disclosed a far greater richness than has ever before been discovered, not only in these mines but in the district—ore yielding 1500 to 3000 per ton, and Mr. Phillpotts in his letter, states that "I do not like to express too sanguine hopes, but may venture to state that the development of this mine (North Aurora) gives us quite a new mine." And unless the geological formation has undergone some curious metamorphic change to accommodate the croakings of London "bears," the same thing must occur and recur again and again at Eberhardt. "Here," Mr. Philpott says, "I have little doubt we shall by-and-bye come upon a deposit which will sustain the character of this mine."

As to the Ward Beecher, its value is attested by Mr. Phillpotts when he says, "I see my way clearly to extract ore of the average assay value of 250 per ton, sufficient to supply the International Mill for the next twelve months," and adding the important statement, the value of which must be fully appreciated by the practical miner, that "the working places are well open, our prospecting or forward work proving well, besides which we have plenty of reserves, my great object being to gradually extend our workings so as to develope the property, and *not follow the plan too often adopted of extracting all the ore from certain places at one time*, and perhaps some months hence have to incur considerable expense in prospecting for new developments." In other words, Mr. Phillpotts is working the mines in a sound, miner-like way, and not "picking out the eyes" in order to produce a sensational but ephemeral result.

These few facts should be borne in mind by, like myself, each of my brother proprietors who intend to remain. An Unfrightened Shareholder.

Grand Hotel, Brighton, Oct. 11.

TUOLUMNE GOLD MINING COMPANY.

Sir,—How is it that the shareholders in this company are kept in such a state of ignorance as regards the operations at the mine? In the last report it was stated that the company possessed two valuable mines—the Martin and the Grizzly—but that there was not sufficient capital to work both of them. If this be the case, why not sell one of the mines and work the other vigorously. At present there seems no quotation for the shares, and nothing whatever to be done in them. A Shareholder.

[For remainder of Original Correspondence see to-day's Journal.]

FOREIGN MINING AND METALLURGY.

The condition of the Belgian iron trade continues exceptionally good. It is many years since the various works devoted to the production of pig, special iron, plates, merchants' iron, &c., have had so much to do. Most of the proprietors are daily refusing orders. The foundries and engine-shops are relatively less active, but still their proprietors have no complaints to make as to the state of affairs. Some of the rail makers, however, are beginning to look out rather anxiously for orders. All the establishments devoted to the manufacture of railway plant have work assured to them for the remainder of the year, and approaching adjudications of some importance on the part of the Belgian State system and sundry foreign companies will, probably, allow them to obtain work for the ensuing season upon favourable terms. The Belgian General Railways Working Company has received this week an order for a second lot of 200 coal trucks for the Royal Sarrebruck Railway. Several locomotives have also left the company's Tubize Works of late for distant parts, as well as for Alsace and Lorraine. Tyres and axles continue to make default to such an extent that many truck manufacturers find themselves at present much embarrassed. Official tables have just been issued in illustration of the commercial relations of Belgium with other countries during the first six months of this year. It appears that the imports of minerals and limailles into Belgium to June 30 this year amounted to 291,457 tons, of which 226,830 tons came from the Zollverein, and 59,702 tons from France. The aggregate imports of minerals to June 30 this year show a falling off of 38,761 tons, as compared with the corresponding period of 1870. The total quantity of iron imported into Belgium in the first six months of this year amounted to 46,107 tons, against 55,897 tons in the corresponding period of 1870, showing a falling off this year of 9790 tons. The exports of minerals and limailles from Belgium amounted in the first six months of this year to 77,574 tons, against 90,742 tons in the corresponding period of 1870. The exports of rough pig and old iron to June 30 this year amounted to 14,298 tons, against 3729 tons in the corresponding period of 1870. The exports of rails from Belgium to June 30 this year only attained a total of 38,486 tons, while the corresponding total for the corresponding period of 1870 was 66,833 tons, showing the heavy diminution of 28,397 tons this year. In the total of 38,486 tons the Zollverein figured for 9289 tons; the Low Countries, for 1170 tons; Austria, for 1306 tons; Turkey, for 500 tons; and Russia, for only 580 tons. The exports of plates from Belgium to June 30 this year amounted to 8150 tons, or 3569 tons less than the corresponding exports of the corresponding period of last year. The Zollverein and the Low Countries were the principal consumers of Belgian plates in the first half of this year, the former having taken 3562 tons, and the latter 2534 tons; after these came Russia as a purchaser of 674 tons, while France took 656 tons. The aggregate exports of pig and iron of all descriptions from Belgium in the first half of this year were 106,859 tons, against 133,851 tons in the corresponding period of 1870, showing a diminution of 26,992 tons. The best clients of Belgium were the Zollverein, the Low Countries, and France, which took 13,975 tons, 3812 tons, and 1619 tons respectively. The house of Cail and Halot

have had to deal with a strike on the part of their workpeople. The "difficulty" has been adjusted upon the following terms:—1. The working day to be reduced to ten hours without reduction of wages. 2. Supplementary hours—or, in plainer English, overtime—to be paid for at the rate of 50 per cent. extra.—3. Fines to be wholly suppressed.—4. Pays to remain monthly, but the workpeople to receive an instalment on account every fortnight. The workmen of MM. Enthoven and Deville, who some time since carried the ten-hours system, are said to have solicited a return to the old working arrangements, as they found that by the new plan they only earned 33*s.* or 34*s.* per week, instead of 48*s.* to 52*s.* per week, as in old times. MM. Enthoven and Deville are also stated to have assented to the curious application made to them.

The coal trade continues firm in Belgium, and prices are well supported. Everything would go well if trucks were not so scarce. It appears from official returns that in the first half of this year the imports of coal into Belgium amounted to 97,847 tons, against 115,706 tons in the corresponding period of 1870; the imports of coke were 997 tons and 5396 tons respectively. The exports of coal from Belgium in the first half of the present year amounted to 1,353,946 tons, showing a reduction of 490,201 tons as compared with the corresponding period of 1870. The exports of coke from Belgium in the first half of this year were 196,856 tons, against 361,983 tons in the corresponding period of 1870.

The Paris iron market has been improving from day to day. The ironfounders are very fully occupied with orders for ironwork intended to be used in the re-construction of demolished buildings, as well as new buildings. The construction workshops are well provided with orders, many of which are of considerable importance, especially as regards railway plant, sugar manufacturing apparatus, machine tools, &c. In the Haute-Marne there is a satisfactory current of affairs, the demand being firm for machine iron, sheets, and special iron. Since a fall which has taken place in prices affairs have regained a little more animation in coke-made iron. Metallurgical products are quoted without change. In the Meurthe and the Moselle the production of the blast-furnaces has been ordered in advance, at 3*l.* 2*s.* 6*d.* to 3*l.* 4*s.* per ton. The management of mining affairs in Alsace and Lorraine has just been regulated by a decree of Sept. 7, 1871. The Bonn Superior Council of Mines has been specially charged with this service. There will be two arrondisements, that of Metz comprising the old department of the Moselle, the detached communes of the Meurthe, and the cantons of Saar-Thrion and Drulingen; and that of Strasburg comprising the two departments of the Rhine, less the cantons indicated. The price currents at present established in Germany attain such a level that the introduction of German iron and pig into France by virtue of the Alsace and Lorraine Customs treaty is not to be feared. On the contrary, the works of the departments annexed will have a great advantage in disposing of their products in the Germanic Confederation. They will thus, probably, make larger profits than they realised before the war. The Marseilles Gas and Blast-Furnaces and Portes and Senechas Mines Company has been paying this month the balance of its dividend for 1870, or 11*s.* 3*d.* per share. The Graissessac United Mines Company will pay, after to-morrow (Sunday), the balance of its dividend for 1870. The Rive-de-Gier Collieries Company will pay, on the 26th proximo, a dividend for the first half of the year 1871, or 1*s.* 3*d.* per share.

At the periodical sale of the Dutch Society of Commerce Banca tin realised 78½ fls. to 78¾ fls. As higher rates had been generally anticipated at this sale the demand was rather active, and all the more so since speculators for the fall wanted to cover themselves for sales made *a terme*. French and German consumers also purchased largely, and the result has been a further advance in prices, Banca having gone to 80 fls., 80½ fls., and Billiton to 79½ fls. to 80½ fls. The disposable stock of Billiton at the close of September is returned at 118,717 ingots, as compared with 48,546 ingots at the close of September, 1870. At Paris, Banca has brought 146*l.*; Straits delivered at Havre or Paris 144*l.*; and English delivered at Havre or Rouen 141*l.* per ton. At Paris, rough Chilian copper delivered at Havre has brought 72*l.*; ditto in ingots, 77*l.* 4*s.*; tough cake, 76*l.*; and Corocoro mineral, pure standard, 74*l.* per ton. At Rotterdam, Stolberg lead has brought 11 fls.; and German of various marks, 10¾ fls. At Marseilles lead in saumons, first fusion, has realised 17*l.* 6*s.*; ditto, second fusion, 17*l.*; argentiferous, 17*l.* 6*s.*; ditto, in shot, 20*l.* 8*s.*; and rolled and in pipes, 20*l.* per ton. Zinc in plates, re-cast, has made at Marseilles 17*l.* 16*s.*; and rolled 28*l.* per ton, with a discount of 3 per cent.

The price of coal has remained about stationary at Paris, notwithstanding the great demand for domestic purposes, and the increasing dearness of freight and transport. The railway stations are blocked up with full and empty coal trucks, and a ministerial circular has been issued, with the view of stimulating the railway companies to accelerate their deliveries, if possible. There is little news to communicate from the coal mining centres.

THE PITTSBURG GOLD MINING COMPANY.

The property possessed by this company, situated near Nevada, California, has been recently carefully examined and reported upon by Mr. J. D. Hague. The object of the board in obtaining the opinion of this American authority was to verify or otherwise the representations of Mr. J. Ross Browne as to the value and capabilities of the mine.

The surface of land granted to the company by United States patent includes within its limits only a portion of the length of vein (2000 feet) conveyed by the same patent. The vein has been clearly traced through three faults, and appears to be enriched by them, as streaks of free gold occur with greater frequency in their neighbourhood than elsewhere. The length of vein developed, measured from the north boundary to the south end of the mine, is about 800 or 900 feet, and the depth already reached in the north shaft is 783 ft. The vein is enclosed in a hard greenstone, which is usually fine-grained, compact, and of homogeneous character, but slaty enough in structure to cleave or break well on blasting. The walls are pretty well defined, especially the footwall, and are readily distinguished and followed, even when the vein is pinched to a mere seam in thickness. It consists of white or bluish-white quartz, carrying some free gold, and considerable quantities of gold-bearing iron pyrites; and its walls sometimes approach each other closely, pinching the vein to a mere seam, and again expand to a width of 3 or 4 feet. Its average thickness is estimated at 18 inches, although Mr. Hague, for safety, prefers to put it at 12 or 13 inches. The distribution of gold in the quartz, if not entirely uniform, is described as somewhat remarkable, in so far that all the quartz of the vein is considered as milling rock. The free gold is sometimes, though not everywhere, visible; the sulphurets or pyrites, with which much of the gold is associated, is generally present in greater or less quantities throughout the vein.

After minutely describing the different workings in the mine, Mr. Hague proceeds to refer to the developed reserves. These are estimated at 12,715 tons, taking 13 feet of solid vein as equal to 1 ton, and assuming the thickness of the vein over all the area embraced in the claim will average 12 in. In this estimate no account is taken for the ground north of the north boundary (although the north extension, if acquired, as proposed by Mr. Browne, will form an important element in the future value of the mine), nor anything south of the second slide at the south end of the mine. Mr. Hague adds that of the ground beyond these visible reserves but little can be affirmed in advance of development, except that all the indications of its value are very favourable. The vein in the bottom of the mine appears as well as ever, and affords satisfactory evidence of continuance in depth.

The equipment of the mine is described as excellent, and amply sufficient for greater duty than hitherto required. The mill is conveniently located with reference to the supply of ore, and contains a Blake's rock-breaker, ten stamps, in two batteries of five each, weighing 650 lbs. per stamp, dropping 10 in. 80 times per minute. The cost of milling is placed at $2·25 per ton. The mill is well built, compact, and substantial, while the stamps are in good order, and well put up. The power provided is ample for 20 stamps, and might possibly be made sufficient for 30.

From Sept. 1, 1869, to Aug. 1, 1871, the value of the bullion returned was $272,283·69, to which must be added a portion of the value of a certain amount of bullion produced on shares, the bars of which are sold to the banker, the product being divided between the company and the miner. The amount of cash received from this source and credited to bullion account is, as nearly as can be made out, $15,813; and as the average rate of division between the company and the miner is one-half each, it follows that the same amount as that above-named has been paid by the banker to the miner, and never entered in the accounts of the company, making the total product for 23 months $288,197, the total expenditure during the same period having been $221,019, including $15,000 paid for other purposes than the business of mining and treating the ore from which the product was derived, making the actual cost of the working $206,000. The yield per ton is estimated at $36, and the profit at $10·25 per ton. The larger portion of the expenditure for opening ground in advance and for accumulating supplies has been made during the past year, and, therefore, the actual profits are stated to have been between $45,000 and $50,000. It appears that the profit of 10 stamps during the past year have been between 9000*l.* and 10,000*l.*; and assuming the same relation of cost and yield for 30 stamps, the expected profits might be from 25,000*l.* to 30,000*l.*

As a property of established value, Mr. Hague fully concurs with Mr. Ross Browne, and one also which promises to sustain a high reputation in the future. Its locality and surroundings are all favourable, and its equipment, both for mining and milling, excellent. The lode is well defined and productive, its average thickness from 12 to 18 in., and there are no present indications of any diminution either in size of vein or yield of ore. The developed reserves are sufficient to supply a 30-stamp mill at least one year, and perhaps more. It has been already shown that, taking the vein at 12 in. thick, the ore in sight may be estimated at 12,700 tons, and the net value at $10 per ton would be $127,000. A greater thickness (say) of 15 or 18 in. would increase this value to $160,000 or $190,000.

The chief difference between Mr. Hague and Mr. Browne would seem to be in the estimate of profits, due to the fact that Mr. Browne places the costs of operation at too low a figure. As an equivalent for the reduced estimate of profits, Mr. Browne proposes to add to the property of the company (without further cost) 1000 ft. additional lode of the north extension, and adjoining the present mine; this extension, so far as developed, induces Mr. Hague to regard it as a valuable acquisition to the Pittsburg Mine.

Believing that the past record fully establishes the value of the property, and that the present indications afford sufficient promise of a much greater capacity than has yet been developed, Mr. Hague recommends its purchase, for under wise management he thinks the enterprise would do credit to American mining interest abroad, and afford satisfactory returns to its owners.

Accompanying the report above alluded to, Mr. Ross Browne has addressed a letter to the directors of the company, in which he states that the examination of the mine was critical; nothing was omitted in the interest of the purchasers, and whatever Mr. Hague deemed necessary to convey a correct understanding of the character of the lode and value of the property was duly noted. Mr. Browne adds, that he believes the property as now situated is of far greater value than that originally proposed in his report. Mr. Browne is better satisfied than ever that it will prove a remunerative and creditable enterprise, and that if he had the management he could make it give complete satisfaction to the company.

The directors are unanimously of opinion that Mr. Hague's report is eminently satisfactory, and proves the property is amply worth the price proposed to be paid for it; but as the estimates vary from those adopted from the data in possession of the board at the time the prospectus was issued, it is considered desirable that shareholders should have an opportunity of expressing their views on the question of the purchase before any action be taken. For this purpose an extraordinary general meeting has been convened for to-day, the details of which will appear in next week's Journal.

FOREIGN MINES.

Don Pedro North del Rey (Gold).—Telegram from Lisbon: Produce for August, 14,900 oits.; weighed to Sept. 18, 5700 oits.—Comparison: August, 14,900 oits.; first division of next month, 5700 oits.; previous month, 15,717 oits.; first division of next month, 5980 oits.; corresponding month last year, 7672 oits.; first division of next month, 1769 oits.

Mineral Hill (Silver).—The directors announce the receipt, per steamer China, from New York, of seven bars of silver, value $8081.

Sierra Buttes (Gold).—The directors have received the following telegram:—"The result of the clean-up for September is as follows:—Receipts, $41,320: 2937 tons of ore were crushed during the month; cost of mining and milling same, at $14·53 per ton, $13,304."

Pacific.—The directors have received the following telegram from Mr. H. Sewell, their agent at Lander Hill:—"Will crush without delay first-class ore 50 tons, and forward bars."

— H. Prideaux, Lander Hill, Sept. 19: The sump-winze is 130 feet below the 400 ft. level; the ledge in the bottom of this winze is 18 in. wide, and yielding very rich ore. In the rise under the sump-winze the ledge is 1 foot wide, containing stephanite and black sulphuret of silver, which is very rich. The ledge in the north cross-cut is yielding a quantity of good ore. There is no particular change in the stopes to notice—Nos. 3, 5, 6, and 7 are looking well. The teams are hauling our ore to the Pacific Company's Mettacom Mill.

Exchequer.—L. Chalmers, Bulliona, California, Sept. 18: We have every reason to believe we are entering a large body of ore, and you will be glad to hear that we had no sooner made the connection with the winze referred to in my last for the ventilation of the ore stopes, than a rich shute of ore was struck overhead about 9 feet from the rise; boulders of 30 lbs. weight that will mill $200 or $300, soft ore worth $350, and picked pieces $1000 to the ton. Messrs. Schwerin, Coulter, and Rickard, who were here yesterday, say it is splendid ore, light and dark ruby, and black sulphuret. As soon as I can get down 200 feet further, and drive a 1000 feet on your magnificent ledge, so as to get men enough in to get out rock, I will keep your mill running day and night, even if it has 50 stamps. It is difficult for me at this distance to impress on you more forcibly than I have done that you have a most valuable property when fully developed. Already it offers its first fruits; I have told you how to secure an abundant harvest.

New Zealand (Quartz Crushing and Gold).—Mr. J. Simpson, the Secretary, writes—"I am pleased to be able to state that the arrangement made in February last with the Puketutu Gold Mining Company and the above company is likely to turn out a splendid success as soon as we are in a position to work the reef, arrangements for doing so immediately being almost completed. The Puketutu quartz reef is a continuation of the same leader which has yielded an average of 6½ ozs. of gold to the ton of quartz for the Tokatea Gold Mining Company. The terms upon which the New Zealand Quartz Crushing and Gold Mining Company work the reef are 15 per cent. of the value sold or gotten from the said reef to be paid to the Tokatea Company. The width of the reef varies from 14 to 20 ft."

Rhine.—Oct. 3: Schmelzer: Very good progress is at present being made in sinking Henty's shaft; 14 ft. remain to be sunk to make the shaft deep enough for a 27, and to give a sump of 3 ft.; with moderate success this will be accomplished by the end of the month. The Tom lode is still in the shaft, and has increased in size from 2½ ft., its width in the 17, to 6 ft., its present size. The lode is more compact, and is composed of quartz, killas, blende, and a little copper. The Tom lode driving north-west of the junction maintains its general character, and yields occasionally good stones of lead ore. The old Schmelzer lode has been intersected in the No. 2 cross-cut, and communication effected with the bottom of Bleibtreu's shaft simultaneously. The lode is 18 in. wide, and consists of friable quartz, killas, blende, and lead ore, good lumps of the latter. The lode is a promising one. This is the Schmelzer lode of the old men, and has been as yet totally unexplored by us to the north-west. At point of intersection it is some 5 fms. further north than our so-called Schmelzer lode, the latter turning out to be a branch or offshoot from the old lode, the splits having occurred some 12 fms. south-east of No. 2 cross-cut. The offshoot has run into the Tom lode, forming the junction already noticed. The accompanying tracing will show you the relation of these lodes to one another. The 15 fathom levels were driven by the former workers on the lode's course 63 fms. Fine stones of lead ore continue to be found in clearing the 15 fm. level, towards Woolf's rise, on the Tom lode; the stuff being removed would, in fact, pay for dressing if in sufficient quantity.—Marienfreude; the sinking of the south shaft was resumed on Sept. 22, and 4 ft. were sunk by the end of the month.

Val Antigoria.—Thomas Roberts, Oct. 5: In the early part of September the captain mistrusted the honesty of the millers at this mine, and made a search, and found in No. 1 mill-house, in the shelf occupied by a miller, Biardone Vincenzo, 41 grammes of amalgam of the estimated value of 32 frs. In calling the man to account he acknowledged before the captain, the clerk, and a miller to have taken it from the mills. The captain asked why did he not consign it; his answer was because he had forgotten; the captain then charged him for robbing it. On the captain informing me of the above, I wrote telling him to put the case before the Giudice (magistrate), which he did, and consigned the 41 grammes of amalgam. The captain was the prosecutor, the clerk and another miller as witnesses. Since that time the clerk and the miller have been called before the Giudice and examined. Cannot say as yet what will be done to the man—very likely transported.

Pestarena United.—T. Roberts, J. Mitchell, J. Roberts, Thos. Warne, Oct. 4: We melted on Oct. 2, and consigned to Signor Carlo Menozzi, the gold for September month. From Pestarena district 107 ozs. 16 dwts. 8 grs.; from Val Toppa district, 280 ozs. 9 dwts. 14 grs.: total, 388 ozs. 6 dwts. 8 grs. The ore amalgamated at Pestarena was 124 tons; and from Val Toppa, 505 tons: total, 629 tons.—Mines, Acquavite: The whim-shaft sinking below the 33 is yielding now 5 tons of ore per fathom, worth 9 dwts. of gold per ton; and the 23 fm. level end, driving south, has further improved; the lode is widened out, and yield about 7 tons of ore per fathom, worth 10 dwts. per ton; we hope this is the commencement of the ore in the ground between the Acquavite and Peschiera Mines.—Peschiera: The end driving north in the 33, on No. 2 lode, yields 3 tons per fathom, worth 15 dwts. of gold per ton. The northern stope in the back of this level yields 3 tons, at 1 oz.; and south stope 7 tons, at 15 dwts. per ton; the end driving north in this level, on No. 5 lode, is poor at present. The stopes in bottom of the 46, on No. 2 lode, yield 4 tons of ore per fathom, worth 16 dwts. per ton; and the stopes in the back 6 tons, at 15 dwts. per ton. Having cleared the whole of the old 55 fm. level end north 100 metres from the engine-shaft we are now in a position to lay out the exact line of the new incline engine-shaft, and no time will be lost in doing this. The so-called boundary stopes in bottom of the 20 yield 6 tons of ore per fathom, worth 15 dwts. per ton.—Surface: We have three large mill beds and 16 running stones already made at Pestarena district, and nearly all the ironwork for 12 large mills on the road to that place.—Val Toppa Mine: The end driving south of cross-cut in Zero level produces 5 tons of ore per fathom, worth 15 dwts. of gold per ton.—No. 2 Level: No. 1 stope, on the flat lode, produces 8 tons per fathom, at 12 dwts.; and No. 2 stope, 7 tons, at 15 dwts.; and a winze sinking under No. 2, on this lode, produces 8 tons, at 12 dwts. per ton. No. 2 stope, on the new lode, produces 10 tons, at 18 dwts. per ton; and a rise, 6 tons, worth 10 dwts. per ton. The stopes south of the winze, in the bottom of No. 2 level, on the new lode, 10 tons, at 15 dwts. per ton; and the stopes in the north of the winze, 12 tons, at 12 dwts. per ton. The stopes in back of No. 2, north of 3d cross-cut, produce 8 tons, at 12 dwts. per ton. The end driving in No. 1 level south, on the western part of the quartz lode, produces 5 tons per fathom, worth 10 dwts. per ton; and the winze sinking on this lode 10 tons, at 10 dwts. per ton. The winze sinking under No. 2 level, on this part of the lode, produces 9 tons, at 8 dwts. per ton. No change in the 4th cross-cut east. The intermediate level between Nos. 1 and 3 levels, on the side lode, produces 8 tons per fathom, worth 15 dwts. per ton; and the stopes in the bottom of No. 3, 7 tons, at 12 dwts. We have cut further into the western part of the great quartz lode, in the 1st cross-cut west, in No. 3 level; the last metre driving the lode is more auriferous; a trial will be made of this part of the lode in the present week. We have resumed driving the second cross-cut west. We have suspended all the stopes on the great quartz lode, and paid off a party of men, on account of the giving out of the wire-rope.

[For remainder of Foreign Mines see to-day's Journal.]

Mining in Ireland—Our Visit to the Cappagh Mines.—These extensive mines it appears were first opened, over sixty years ago, by the late Lord Audley, in consequence of the tenants on the estate having discovered copper ore while digging trenches in a garden. Lord Audley sunk shafts, and in a short time raised and sold 30,000*l.* worth of copper ore, some cargoes realising over 50*l.* per ton. Remarkably fine specimens of malachite were also found during Lord Audley's superficial operations, and a necklace of malachite set in gold, from this mine, was presented to Queen Charlotte, the consort of George III. It is a singular fact that malachite in the Cappagh Mine and the neighbouring mine of Coosheen was not found extending in depth more than about 14 fathoms from the surface. Lord Audley eventually sold these mines for an enormous sum of money, to the celebrated "West Cork Mining Company," and it appears that 100,000*l.* were expended by them in various ways, and never a drop of water drained out of the Cappagh Mines. A chancery suit of many years took place between the executors of Lord Audley and the directors of the West Cork Company, and which only terminated by the sale of the property under the Encumbered Estates Court, a few years since. The mineral royalties and part of the estate were then purchased by the late Mr. T. S. Cave, when, after an ineffectual attempt to develope the mines, they became by purchase the property of the present Cappagh Mining Company. We had great pleasure in looking over the extensive works; it was a busy scene. The ponderous engine—equal, we understand to 300-horse power—does its work silently and effectually, and is of sufficient power to drain the water from a depth of 350 fms. Another powerful engine is employed in hauling the stuff, crushing the ore, working the inclines, tramways, &c. We were surprised to see the heavy skips coming up, with shining ore, from the deep recesses of the earth, drawn by a steel wire-rope, one inch in diameter, and capable it seems of a working strain of 25 tons. The ore stuff by a simple contrivance is conveyed into tram-waggons, which are run out on a platform to the washing-floors, being first emptied on to a self-acting screen, and then picked and sorted in different qualities by the nimble fingers of little boys and girls. The small ore stuff is separated from waste by a mechanical apparatus, called "jiggers." The larger rocks of ore are broken by strong men with large sledge-hammers, and then girls are employed in the process of "cobbing," previous to its being passed through the iron rolls of the crusher. To a novice looking at what appeared to be rubbish heaps coming from underground, it seemed impossible to extract any value from it, but when we examined the jiggers and washing-trough there was the precious ore, shining like gold. By simple contrivances the particles of ore carried off during the process of washing, jigging, &c., are caught in a succession of troughs, so that nothing escapes the watchful eye of the manager. The copper yards, washing floors, &c., are walled in, inside which are sheds for the workpeople. At night these yards are locked up, and everything made secure; all the surface works are laid out in a systematic manner, and the strictest economy carried out in every department. There is the manager's residence on the mine; also residences for engineers, pitmen, storekeeper, &c., together with blacksmiths' and carpenters' shops, storehouses, and every other appliance requisite and necessary for carrying on the operations of a large concern. We were favoured with a view of the plans of the underground works, from which we saw that the deepest shafts are 104 fathoms from the surface. We were shown specimens of the ore from the upper galleries and also from the bottom of the mine, from which it is perfectly clear that the ore becomes richer in quality as greater depth is attained. The important fact was also pointed out to us that the rock becomes much softer and metalliferous in sinking to the deepest point yet reached than it was 20 fathoms above. It was clearly explained to us by the able manager, who his acknowledged by distinguished men to be the highest and oldest mining authority in the South-West of Ireland, that it was simply a matter of time it required to lay open the mine, in order to its becoming of equal value to any mine in the kingdom; for, as he remarked, "it is an established fact that the present paying mines are those which have been re-worked." We saw many beautiful specimens of copper ore, which contain silver and gold. We also saw the analysis of part of the same specimens by the assayers to the Mint, also by Mr. Claudet, assayer to the Rothschilds which gave 12 dwts. of gold and 13 ozs. 5 dwts. of silver to the ton of ore. The last cargoe of copper ore sold in Swansea gave 6¾ ozs. of silver to the ton of ore. In concluding our remarks on the Cappagh Mine, we cannot avoid asking—there is not a greater spirit of enterprise in this country?—*The West Cork.*

Industrial Progress in Ireland.—We lately alluded to the intended industrial establishments in the West, and there is a rumour of a further important movement in another direction. In addition to the pottery works at Belleek, the enterprising proprietor of the estate comprising these works has arranged for the erection of a Heffmann kiln, for the manufacture at a cheap rate of both lime and bricks, and probably cement, the estate abounding with many and various valuable deposits, and there being already several of these kilns in the North of Ireland. For instance, between Mr. Bloomfield's property at Castlecaldwell, where the kiln will be erected, and Londonderry, a Heffman kiln has been recently built by Mr. M'Glunis, of Strabane, close to Porthall station on the Irish North-Weston Railway, and both kilns will, doubtless, contribute by their produce to increase the traffic on the line mentioned, as well as on the Bundoran and Euniskilien, Mr. Bloomfield's limestone being already prized in Derry. It is also stated that this gentleman is arranging for bringing forward his really *fine hematite iron ore*, which description is so scarce and so much wanted by the ironmasters of England for mixing with the poorer ores available on the other side of the Channel.—*Freeman's Journal.*

Artificial Asphalte.—The object of the invention of Messrs. Vandemark and Scharf, of Jersey city, U.S., is to impregnate calcareous substances with bitumen, therby producing an artificial asphalte rock, which can be used with advantage for pavement and for roofing, which shall be impervious to water, unaffected by the heats of summer or the frosts of winter, fine grained, homogenous, tough, and durable. The said invention consists in the combination, mixture, and appliance of the constituent parts:—bitumen, paraffin oil, and a calcareous substance. These ingredients are placed in a proper vessel and heated.

COPPER ORES.

Sampled Sept. 20, and sold at Tabb's Hotel, Redruth, Oct. 5.

Mines.	Tons.	Price.	Mines.	Tons.	Price.
West Wheal Tolgus	87	£3 19 0	South Crofty	34	£3 2 6
ditto	86	3 18 6	ditto	30	3 3 6
ditto	81	4 1 0	ditto	15	9 6 6
ditto	73	3 0 0	East Pool	93	3 2 6
ditto	71	3 17 6	ditto	78	3 6 0
ditto	69	4 1 0	ditto	33	3 3 6
ditto	37	2 2 0	ditto	21	3 9 0
West Wheal Seton	74	5 16 0	North Treskerby	68	3 18 6
ditto	52	6 2 6	ditto	43	3 16 6
ditto	51	2 7 0	ditto	25	1 13 0
ditto	48	8 15 6	North Crofty	55	5 12 6
ditto	47	2 8 6	ditto	43	3 9 6
ditto	38	3 12 0	ditto	34	3 15 0
Crenver & Abraham	69	5 15 0	New Pembroke	42	5 1 6
ditto	61	4 5 6	ditto	38	4 16 6
ditto	53	6 0 0	Carn Camborne	45	3 0 6
ditto	52	3 7 6	ditto	25	6 5 0
ditto	51	2 12 6	ditto	4	2 3 0
ditto	17	2 19 0	Wheal Basset	40	5 8 0
Carn Brea	55	3 7 6	ditto	33	6 3 6
ditto	49	3 5 6	Wheal Jewell	38	2 16 0
ditto	48	3 8 6	ditto	5	8 10 6
ditto	44	7 9 0	Wheal Prospor	32	1 13 6
ditto	36	2 16 0	Phillips's Ore	24	3 8 6
ditto	9	0 9 0	Baupfylde	20	12 5 6
Wheal Seton	40	4 9 6	Buglehole's Ore	18	2 15 6
ditto	32	5 3 6	East Basset	12	3 15 6
ditto	75	4 15 6	Cargoil	8	10 3 6
ditto	44	1 4 0	St. Aubyn United	4	9 6 6
South Crofty	60	2 17 0	Wheal Comford	2	2 18 0
ditto	50	2 7 6	Tremillian's Ore	2	6 0 0
ditto	42	1 16 6	Moss's Ore	2	3 17 6

TOTAL PRODUCE.

West Wheal Tolgus	504	£1860 10 6	Wheal Jewell	43	£ 149 0 6
West Wheal Seton	310	1539 10 6	Wheal Prosper	32	53 12 0
Crenver & Abraham	303	1335 1 0	Phillips's Ore	24	82 4 0
Carn Brea	241	943 3 0	Bampfylde	20	245 10 0
Wheal Seton	241	1014 5 6	Buglehole's Ore	18	49 19 0
South Wheal Crofty	231	707 15 6	East Basset	12	45 6 0
East Pool	225	725 5 0	Cargoil	8	81 8 0
North Treskerby	136	472 12 6	St. Aubyn United	4	37 6 0
North Crofty	132	586 6 0	Wheal Comford	2	5 16 0
New Pembroke	80	390 10 0	Tremillian's Ore	2	12 0 0
Carn Camborne	74	300 19 6	Moss's Ore	2	7 15 0
Wheal Basset	73	419 15 6			

Average standard..... £100 13 0 | Average produce..... 6¼
Average price per ton £4 1 6
Quantity of ore .....2717 tons | Quantity of fine copper.. 184 tons 5 cwts.
Amount of money..... £11,071 11 0
LAST SALE.—Average standard..... £101 1 0—Average roduce..... 6¼
Standard of corresponding sale last month, £101 14 0—Produce, 6¼.

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Names.	Tons.	Amount.
Vivian and Sons	490½	£2107 19 10
Grenfell and Sons	551	2861 18 6
Sims, Willyams, and Co.	54	144 4 0
Williams, Foster, and Co.	617¾	2643 5 4
Mason and Elkington	543½	1787 1 4
Copper Miners' Company	231	502 8 6
Charles Lambert	74	429 4 0
Newton, Keates, and Co.	146½	603 9 6
Total	2717	£11,071 11 0

Copper ores for sale at the Royal Hotel, Truro, on Thursday next—Mines and parcels—Devon Great Consols 1406—Marke Valley 454—South Caradon 452—Glasgow Caradon 280—Gawton Copper 256—Hingston Down 220—East Caradon 196—Phœnix 185—Wheal Russell 175—Bedford United 144—Prince of Wales 109—South Carn Brea 90—Gonamena 88—Craddock Moor 71—Westlake's Ore 31—Belstone 7—Total 4164 (21 cwts.)

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